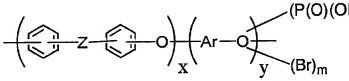
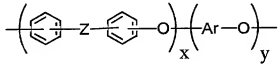
What is claimed is:

1. An aromatic polymer phosphonic acid derivative, which is represented by the formula (2),



(2)

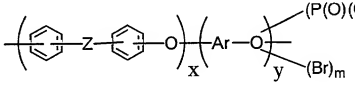
wherein -Z- represents $-SO_2-$ or -CO-, x and y are average molar ratios in the polymer and respectively represent 0.01 to 0.99, provided that the sum of x and y is 1; -Ar- represents a divalent aromatic group having 4 to 18 carbon atoms which may contain hetero atom, and said -Ar- may have one or more substituents; R and R' each independently represent an alkyl group; m and n independently represent an average number of substituents per unit structure (-Ar-O-) of an aromatic polymer compound (1),



(1)

m is 0 to 8, n is a positive number of 8 or less, and the sum of m and n is 8 or less; or

an aromatic polymer phosphonic acid derivative whose free acid form is represented by the formula (3):



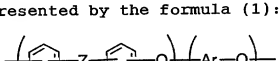
(3)

wherein -Z-, x, y, -Ar- m and n have the same meaning as above,

and R'' represents hydrogen or an alkyl group.

2. The phosphonic acid derivative according to claim 1, wherein -Ar- is a phenylene group which may have one or more substituents or a biphenyldiyl group which may have one or more substituents.

3. A process for producing an aromatic polymer phosphonic acid derivative represented by the above formula (2), wherein the process comprises brominating an aromatic polymer compound represented by the formula (1):



(1)

wherein -Z-, x, y and -Ar- have the same meaning as above, with a brominating agent, and acting thereon a trialkyl phosphite represented by the formula (4):

P(OR)(OR')(OR''') (4)

wherein R, R' and R''' each independently represent an alkyl group, in the presence of a nickel halide catalyst in an organic solvent.

4. A process for producing an aromatic polymer phosphonic acid derivative of the free acid form represented by the above formula (3), wherein the process comprises brominating an aromatic polymer compound represented by the formula (1) with a brominating agent, and acting thereon a trialkyl phosphite represented by the above formula (4) in the presence of a nickel

halide catalyst in an organic solvent to give an aromatic polymer phosphonic acid derivative represented by the above formula (2), and then hydrolyzing said acid derivative.

5. The process according to claim 3 or 4, wherein nickel chloride (II) is used as the nickel halide.

6. The process according to claim 3 or 4, wherein an amide compound is used as the organic solvent.

7. The process according to claim 3 or 4, wherein at least one compound selected from trimethyl phosphite and triethyl phosphite is used as the trialkyl phosphite.

8. A process for producing an aromatic polymer phosphonic acid derivative of the free acid form represented by the above formula (3), wherein the process comprises hydrolyzing the aromatic polymer phosphonic acid derivative represented by the above formula (2).

9. The process according to claim 4 or 8, wherein the hydrolysis is carried out in the presence of an alkali.

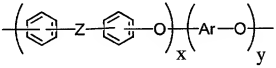
10. The process according to claim 4 or 8, wherein the hydrolysis is carried out in the presence of an acid.

11. The process according to claim 4 or 8, wherein the hydrolysis is carried out after acting a trialkyl silyl halide on the phosphonic acid di-ester.

12. The process according to claim 3 or 4, wherein -Ar- is a phenylene group which may have one or more substituents or

a biphenyldiyl group which may have one or more substituents.

13. A process for brominating an aromatic polymer compound represented by the formula (1) with N-bromosuccinimide in the presence of a strong acid in an organic solvent,



(1)

wherein -Z- represents $-SO_2-$ or -CO-, x and y respectively represent 0.01 to 0.99, provided that the sum of x and y is 1; -Ar- represents a divalent aromatic group having 4 to 18 carbon atoms which may contain hetero atom, and said -Ar- may have one or more substituents.

14. The process according to claim 13, wherein -Ar- is a phenylene group which may have one or more substituents or a biphenyldiyl group which may have one or more substituents.

15. The process according to claim 13 or 14, wherein the strong acid is sulfuric acid.

16. The process according to claim 13 or 14, wherein the organic solvent contains at least one selected from halogenated methanes and halogenated ethanes.

17. A polymer electrolyte comprising, as an active ingredient, an aromatic polymer phosphonic acid derivative represented by the above formula (2) and/or an aromatic polymer phosphonic acid derivative of the free acid form represented by the above formula (3).

18. A polymer electrolyte membrane in which the polymer electrolyte according to claim 17 is used.